



**MUNICIPAL AUTONOMY AND DEVELOPMENT PROJECT**



# **HURRICANE MITCH DAMAGED INFRASTRUCTURE RECONSTRUCTION**

***FINAL REPORT***

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**Prepared for**  
**La Agencia de los Estados Unidos**  
**Para el Desarrollo Internacional**  
**Contract**  
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**Prepared by**  
**PADCO, Inc.**

**MUNICIPAL AUTONOMY AND DEVELOPMENT PROJECT  
HURRICANE MITCH DAMAGED INFRASTRUCTURE RECONSTRUCTION  
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## TABLE OF CONTENTS

### A. NARRATIVE

<b>SECTION I: EXECUTIVE SUMMARY</b>	<b>1</b>
<b>SECTION II: DESCRIPTION OF ACTIVITIES</b>	<b>3</b>
<b>BACKGROUND INFORMATION</b>	<b>3</b>
<b>1. EXPECTED ACHIEVEMENTS AND RESULTS</b>	<b>4</b>
<b>Achieved Results</b>	<b>5</b>
<i>1. Sub-project designs are technically appropriate.</i>	<b>5</b>
<i>2. The construction documentation and contracting arrangements are complete and legally binding.</i>	<b>5</b>
<i>3. The rehabilitation projects are properly supervised and inspected by FISE.</i>	<b>5</b>
<i>4. All works are progressing on time.</i>	<b>6</b>
<i>5. All problems and bottlenecks are resolved.</i>	<b>6</b>
<b>2. MAJOR ACTIVITIES</b>	<b>7</b>
<b>2.1 Selection of Municipalities, Sub-projects, and Costs to be Financed by the Project (USAID Approval)</b>	<b>7</b>
<b>2.2 Design Contracting: Difficulties and Solutions</b>	<b>12</b>
<b>2.3 The Design Process: Difficulties and Solutions</b>	<b>14</b>
<b>2.4 Reduction of the Initial Program: Reasons for Canceling Sub-projects</b>	<b>15</b>
<b>2.5 Construction Contracting: Implementation Difficulties</b>	<b>16</b>
<b>2.6 Project Completion, Transfer, and Sustainability</b>	<b>21</b>
<b>2.7 Project Implementation Summary</b>	<b>23</b>
<b>3. LESSONS LEARNED</b>	<b>24</b>

### B. ADMINISTRATIVE INFORMATION

<b>1. GRANT INFORMATION</b>	<b>26</b>
<b>2. MANAGEMENT CONTRACT INFORMATION – CLIN. 6</b>	<b>26</b>
<b>ANNEXES: Detailed Information of Each Sub-Project</b>	<b>28</b>
<b>ATTACHMENTS</b>	

## A. NARRATIVE

## **SECTION I:**

### **EXECUTIVE SUMMARY**

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#### **THE SETTING FOR INFRASTRUCTURE RECONSTRUCTION**

Hurricane Mitch caused an estimated US\$1.3 billion of damage in the social and infrastructure sectors in Nicaragua in October 1998. Housing accounted for about 30-40% of total damages, while another 55 percent occurred in the transportation, water and sanitation sectors. Some 83 municipalities, of a total of 147, suffered major damage to physical infrastructure, including roads, bridges, storm sewers and drainage systems, potable water supply and distribution, waste water collection and treatment systems, cemeteries and slaughter houses.

#### ***Participating Institutions***

In the years prior to the Hurricane, USAID/Nicaragua had established a capital investment fund to finance community development projects as a key feature of its municipal development initiatives. Therefore, as part of the US Reconstruction Program Grant Agreement with the Government of Nicaragua post-Mitch, USAID provided funds for the preparation and implementation of at least 20 basic infrastructure reconstruction sub-projects in selected municipalities. The contract of PADCO Inc., USAID contractor for the ongoing Municipal Autonomy and Development Project (MADP), was amended in order to provide for oversight and monitoring services under the new component. Implementing agencies included:

- Fondo de Inversión Social de Emergencia (FISE), for all sub-projects except those located in the Municipalities of León and Matagalpa.
- Municipality of León, for sub-projects located in León;
- Municipality of Matagalpa, for sub-projects located in Matagalpa.

#### ***Eligible Sub-projects***

Eligible sub-project sectors included: repair of roads, streets, bridges and sidewalks; rehabilitation of storm drainage system; cleaning streambeds within urban areas; restoration and reinforcement of culverts, embankments and retaining walls; and rehabilitation of water and sewer systems.

#### ***Funding***

US\$3,570,00 was initially obligated to fund all sub-projects, including design, supervision and administrative costs. Subsequently, USAID cancelled the construction of 12 sub-projects and reduced the funding by US\$1.5 million to US\$2,070,000.

#### ***Sub-project Designs are Technically Appropriate***

- Three (3) sub-projects designed by the implementing institutions and USAID (Matagalpa, León and Posoltega).
- Scopes of work prepared by FISE for two projects (Yalaguina and San Lucas)
- Thirteen (13) sub-project designs prepared by A&E contractors, providing the basis for construction contracted by FISE
- Five (5) sub-projects were cancelled because sub-project activities had already been undertaken by other donors or GON institutions.

### ***Construction Documents/Contracting Arrangements Complete/Legally Binding***

Eleven sub-projects were contracted for construction:

- PADCO reviewed the contracts awarded by the municipalities of Leon and Matagalpa.
- USAID staff reviewed the Posoltega sub-project.
- PADCO also reviewed and monitored all eight (8) sub-projects contracted by FISE

### ***Rehabilitation Sub-projects are Properly Supervised and Inspected by FISE***

- PADCO activities not limited solely to qualify FISE sub-project supervision but included supervision of the complete construction process
- Three (3) PADCO engineers visited/supervised sub-projects in the north, west and northern central region of the country at least three (3) times a week.
- PADCO, together with FISE, analyzed all necessary change orders and authorized all work in progress payments.
- PADCO engineers coordinated all project activities with the FISE contracted supervisors.

### ***All Works are Progressing on Time***

Even though most of the sub-projects were not completed on schedule, PADCO put a great deal of pressure on contractors and FISE in order to minimize project completion delays. The main contractor difficulties were the lack of financial resources to implement the sub-projects and the highly bureaucratic FISE payment process.

### ***All Problems and Bottlenecks are Resolved***

Delays during the design process and the reticence of A&E contractors to accept international norms and standards in the preparation of plans and specifications were the main project bottleneck.

In order to resolve these bottlenecks, PADCO: 1) hired an expatriate engineer to oversee the design process, 2) conducted workshops with A&E staff to improve designs and 3) completed those designs that A&E contractors refused to finish.

PADCO was involved in all daily operations during the construction process; advising and assisting FISE and construction contractors to solve problems.

## **SECTION II:**

### **DESCRIPTION OF ACTIVITIES**

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#### **BACKGROUND**

On late October 1998, Central America experienced the worst natural disaster in two centuries to hit the region, the Hurricane Mitch, affecting mainly Honduras and Nicaragua. The fury of the storm poured out record levels of rain on Central America causing widespread flooding and landslides. Nicaragua had been making considerable economic progress prior to the storm. GDP was increasing, and inflation was holding steady. Nicaragua was in strict compliance with its Economic Structural Adjustment Facility and moving toward qualifying for the highly indebted poor Countries (HIPC) program which would bring needed debt relief. Then, in the space of a few days, Mitch wrought havoc on the country.

The areas affected most by Mitch, located in the north and northwest part of the country, coincide with the poorest regions of Nicaragua. The Atlantic region, with its large indigenous population, suffered flood damage only along the Rio Coco and its tributaries.

In Nicaragua, over 3,000 people lost their lives due to Hurricane Mitch, with the most tragic loss occurring at Posoltega where some 2,000 people died in one huge mudslide. The transportation sector was knocked out of operation with extensive damage to roads and bridges. A large part of the population had no potable water and storm sewers were not able to handle the volume of runoff. Hundreds of schools were damaged and many became temporary shelters for Mitch-affected families who had lost their homes and livelihoods. Approximately 17,000 homes were totally destroyed.

The small farmer, which are the future of Nicaragua, suffered greatly. More than 25% of the country's cropland was damaged by the flooding. Despite the serious 1997-1998 El Niño drought, Nicaragua's agricultural sector had been performing well. A growth rate of 9% had been predicted for the sector for 1998, exceeding the 8.35% rate of 1997. However, as a result of Mitch, the agricultural rate only reached slightly over 4% in 1998.

The Government of Nicaragua estimates the cost of reconstruction at more than US\$1.3 billion. The IDB and the UNDP agree that, or the total damage caused in the social and infrastructure sectors, some 30-40% represent housing, while around 55 percent is in the transportation, water and sanitation sectors.

Some 83 municipalities, of a total of 147, suffered major damage to physical infrastructure, including roads, bridges, storm sewers and drainage systems, potable water supply and distribution, waste water collection and treatment systems, cemeteries and slaughter houses. Reconstruction needs at those municipalities included rehabilitation of roads and streets, cleaning streambeds within urban areas, reinforcement of culverts and river embankments and reconstruction of water storm sewer systems.

Capital investment in community development project has been a key feature of USAID municipal development initiatives in Nicaragua. Under the former Municipal Decentralization and Development Project (MDDP), USAID established a Capital Fund to finance the identification, development, and implementation of community development projects, carried over to the ongoing Municipal Autonomy (MADP).

As part of US Program Grant Agreement to assist the Government of Nicaragua in post-Mitch reconstruction, USAID contracted PADCO, Inc. to provide management and monitoring services for Basic Infrastructure in Selected Mitch-Affected Municipalities Repair, added to the regular contract as Component 6. The Component called for the preparation and implementation on a grant basis of about 20 basic infrastructure sub-projects in selected Mitch affected municipalities. The sub-projects would be implemented by three implementing Agencies, as follows:

- Fondo de Inversión Social de Emergencia (FISE), for all sub-projects excluding those located in the Municipalities of León and Matagalpa.
- Municipality of León, for sub-projects located in León;
- Municipality of Matagalpa, for sub-projects located in Matagalpa.

The eligible sectors for sub-project implementing were: repair of roads, streets, bridges and sidewalks; rehabilitation of storm drainage system; cleaning streambeds within urban areas; restoration and reinforcement of culverts, embankments and retaining walls; and rehabilitation of water and sewer systems.

The total amount of funding initially obligated for all sub-projects, including design, supervision and administration costs, was US\$3,570,000. Later USAID cancelled the construction of 12 sub-projects and reduced the funding by US\$1.5 million to US\$2,070,000.

The PADCO role in the implementation of these sub-projects was defined during the establishment of the Capital Fund under the precursor MDDP project. While FISE has financial control and management responsibilities for the Fund, PADCO was responsible for oversight and coordination. This involved, monitoring the project cycle and ensuring that the implementing agencies (FISE and the municipalities) are making satisfactory progress in the design and implementation of specific sub-projects.



## 1. EXPECTED ACHIEVEMENTS AND RESULTS

PADCO was contracted to provide local Nicaraguan engineers to give technical assistance to FISE and selected municipalities in the selection, coordination and supervision of the execution of the sub-projects, as required, to assure the following:

- Sub-project designs are technically appropriate.
- The Construction documentation and contracting arrangements are complete and legally binding.
- The rehabilitation sub-projects are properly supervised and inspected by FISE.
- All works are progressing on time.
- All problems and bottlenecks are resolved.

PADCO proposed a strategy and work plan for the project component that was approved by USAID (Attachment No.1). The proposed strategy was based on the assumption that timely implementation of all works (completion of all sub-projects in two (2) years) presented the greatest challenge under this activity. The tight timeframe was the major factor in USAID'S initial decision to identify FISE as the implementing agency in the majority of the sub-projects, given that a rule of thumb estimate for the completion of an infrastructure project is 18 months.

### **Achieved Results:**

#### *1. Sub-project designs are technically appropriate. Of the initially identified 23 sub-projects:*

- Three (3) sub-projects designed by the implementing institutions and USAID (Matagalpa, León and Posoltega).
- Scopes of work were prepared by FISE for two projects (Yalaguina and San Lucas)
- Thirteen (13) sub-project designs prepared by A&E contractors with construction contracted by FISE
- Five (5) sub-projects were cancelled because sub-project activities had already been undertaken by other donors or GON institutions.

#### *2. The construction documentation and contracting arrangements are complete and legally binding.*

- Eleven sub-projects were contracted for construction:
- PADCO reviewed the contracts awarded by the municipality of Leon and Matagalpa, while the Posoltega sub-project was reviewed by USAID staff.
- PADCO reviewed and monitored all eight (8) sub-projects contracted by FISE to make sure that the responsibilities were clearly established and the commitments between the parties were legally binding. Except for the Tipitapa sub-project, whose legal problem was due to other than properly binding documents, all sub-projects were implemented without any legal disputes and were all requirements were fully met.

#### *3. The rehabilitation sub-projects are properly supervised and inspected by FISE.*

- PADCO did not limit its activities to solely qualify FISE sub-project supervision. PADCO assigned supervisors to review the complete construction process. In fact, PADCO assigned three (3) engineers to supervise sub-projects in the north, west and northern central region of the country. Each sub-project was visited at least three (3) times a week.

In addition, PADCO analyzed all necessary change orders and authorized all work in progress payments with FISE.

- Throughout the project, PADCO engineers coordinated all project activities with the FISE contracted supervisors.

*4. All works are progressing on time.*

- While most of the sub-projects were not completed on the original schedule, PADCO put a great deal of pressure on contractors and FISE in order to minimize project completion delays. As it was stated in another part of this report, the main contractor difficulties were the lack of financial resources to implement the sub-projects and the highly bureaucratic FISE payment process.

*5. All problems and bottlenecks are resolved.*

- The main project bottleneck could be attributed to the design process and the lack of willingness of A&E contractors to accept international norms and standards in the preparation of plans and specifications.
- Designs contracted for a three (3) months period were delayed in some cases up to one year. PADCO had a significant role in solving these bottlenecks; 1 by hiring an expatriate engineer to oversee the design process, 2) by conducting workshops with A&E contractor staff to instruct them on how to improve designs, and 3) by completing designs that A&E contractors refused to finish.
- During the construction process, PADCO was involved in all day-to-day operations and advised FISE and construction contractors on the solution of problems.

## **2. MAJOR ACTIVITIES**

### **2.1 Selection of Municipalities, Sub-projects, and Costs to be Financed by the Project (USAID Approval)**

Based on the strategy that PADCO prepared, USAID approved an implementation plan with four main components:

#### **2.1.1 Identification of Participating Municipalities**

This process was based on the degree of impact of Hurricane Mitch damage, poverty level and political will of the local authorities to solve the problems. PADCO identified and USAID approved 22 municipalities to participate in the project, from a list of 83 affected municipalities that was previously prepared by AMUNIC.

The prioritized list of eligible municipalities was prepared as tool to assist in determining the eligibility of specific municipalities for inclusion in the Component. As a starting point, in order to define the universe of potentially eligible municipalities, PADCO used the list of 83 affected municipalities prepared by AMUNIC. The criteria for prioritization of these municipalities were the following:

**Degree of Impact of Hurricane Mitch.** This criterion was set forth in the PADCO TOR, prepared by USAID. To measure the degree of Mitch impact and for the purposes of a basic infrastructure reconstruction project, one of the most appropriate indicators would be the total length of roads and streets damaged. However, existing data on this and other types of basic infrastructure available for the 83 Mitch-affected municipalities was very poor. Therefore, PADCO selected “damaged or destroyed housing units” as a surrogate variable. Given that the flooding caused by Mitch damaged housing and basic infrastructure (roads, drainage works, water and wastewater networks) was known, it is reasonable to assume that there is a strong correlation between damage to housing and damage to basic infrastructure.

**Poverty Level.** The lack of financial resources in the poorer municipalities impedes local ability to respond adequately to damages caused by Mitch. Although other factors such as management and technical capacity also influence outcomes, we assumed here an inverse relationship between the poverty level of the local population and the capacity to rebuild municipal infrastructure damaged during the Hurricane. PADCO used the poverty classification developed by FISE for the purposes of this analysis.

**Political Will.** Municipalities demonstrating greater political will to rebuild were considered more eligible for assistance. Political will was measured by municipal response to an AMUNIC survey on municipal reconstruction priorities implemented between February and May 1999.

Data on these three criteria for all 83 municipalities was collected. In order to measure each of these criteria and points were assigned as follows. The first criteria “degree of impact of the Hurricane Mitch” was scored by range: 5 points for over 500 damaged or destroyed units, 3 points for between 200 and 500, and 1 point for less than 200. The poverty level data, provided by FISE, assigned 3 points for “extreme poverty”, 2 points for “high poverty” and 1 point for “medium or minor poverty.” With respect to political will, municipalities which submitted data in response to the AMUNIC request for municipal reconstruction preferences received 3 points, while those that did not submit data received 0 points.

The 83 municipalities were ranked by their degree of eligibility to receive assistance under the Component. There were 22 municipalities scoring 9 and above, very close to the original threshold of 20. It was proposed, with a view to maintaining an equitable distribution between the northern region and other affected areas, that the 23rd municipality, Wiwilí, also be included.

### **2.1.2 Identification of Sub-projects**

The identification of sub-projects was done by defining priorities in the selected municipalities with criteria such as: the degree in which the sub-project addressed infrastructure deficiencies directly resulting from damage caused by the Hurricane; the sub-project was a priority of the local government and of the community; the sub-project had not other identified source of financing; and finally, the sub-project fitted within the menu of eligible projects.

The second step in the selection process therefore involved identifying priority sub-projects in the selected municipalities. The selection criteria were the following:

**The sub-project will repair damage caused by Hurricane Mitch.** All projects must address infrastructure deficiencies directly resulting from damage caused by the hurricane.

**The sub-project is in an eligible infrastructure sector.** All projects must include — and be limited to — one or more of the following activities: repair of roads, streets, bridges and sidewalks; rehabilitation of storm drainage systems; cleaning of streambeds within urban areas; restoration and reinforcement of culverts, embankments and retaining walls; and rehabilitation of water and sewer systems.

**The sub-project is a priority of the local government and the community it represents.** The sub-project must either have been included in municipal submissions to AMUNIC on local reconstruction priorities, for which community groups provided inputs, or be identified during Project Startup, with adequate input from civil community groups.

**The sub-project has no identified source of financing.** Eligible sub-projects must be without an identified local, national or international source of financing.

PADCO collected information on all of the Project municipalities and their priority investments, except for Wiwilí. All of these proposed investments were in the area of municipal infrastructure. Project profiles had already been prepared for a number of these sub-projects, either by PADCO or by the municipality.

Once the analysis was completed, PADCO identified a list of 23 sub-projects in the 22 approved municipalities. Only one municipality (Posoltega) was to be benefited with the implementation of 2 sub-projects.

The sub-projects identified were in different stages of preparation: Sub-projects designed awaiting financing, sub-projects with a profile description, and sub-projects still to be identified and profiled.

The sub-projects, municipalities and their status is shown in Chart No. 1

**Chart No. 1**

**Reparación de Infraestructura Básica en Municipios Seleccionados Afectados por Huracán Mitch**  
**Programa de Inversión Preliminar**

Clasificación	Total Municipio	Proyecto Prioritario de Infraestructura	Costo (US\$)	Total Acumulado (US\$)
1	11 Ciudad Darío	Encunetado y Adoquinado Barrio El Edén	255,776	255,776
2	11 Pueblo Nuevo	Reparación de Camino Río Grande-Llano 1	180,000 *	435,776
3	11 San Juan de Limay	Reparación de Caminos Rurales	44,166	479,942
4	10 Chinandega	Mejoramiento Cauce Colonia 12 de Septiembre	154,914	634,856
5	10 Estelí	Reconstrucción de 2 Puentes de 15 m	90,000	724,856
6	10 Posoltega	Reconstrucción Boulevard y Parque José Dolores Toruño	46,293	771,149
7	10 Quezalguaque	Reparación de Caminos, Puentes, Obras de Drenaje	83,333	854,482
8	10 Matagalpa	Drenaje y Revestimiento de Calles en Urb. Aquiles Bonucci	334,052	1,188,534
9	9 León	Drenaje Pluvial Zona Nor-Este	123,448	1,311,982
10	9 Telica	Reparación de Puentes	180,000 *	1,491,982
11	9 El Tuma-La Dalia	Rehabilitación Camino El Tigre-Siempre Viva	44,655	1,536,637
12	9 San Rafael del Norte	Reparación Caminos Rurales	375,000	1,911,637
13	9 Santa María	Construcción de Cuneta, 1800 m	33,333	1,944,970
14	9 Macuelizo	Reconstrucción del Puente Macuelizo	25,000	1,969,970
15	9 Mozonte	Construcción de 3 Puentes	180,000 *	2,149,970
16	9 Totogalpa	Construcción de Cauce Marvin Guerrero, 1000 m	33,333	2,183,303
17	9 Telpaneca	Reparación de 9 km de Caminos Rurales	13,667	2,196,970
18	9 Yalaguina	Reparación de Caminos Rurales (30 km)	50,000	2,246,970
19	9 Palacaguina	Construcción de Cunetas y Adoquinado de Calles, S. 1 & 4	180,000 *	2,426,970
20	9 San Lucas	(Subproyecto a Ser Identificado)	180,000 *	2,606,970
21	9 San Francisco Libre	Construcción de Calles y Cunetas, Lotificación San Fran.	350,000	2,956,970
22	9 Tipitapa	Obras de Drenaje Pluvial, Casco Urbano	300,000	3,256,970
23	8 Wiwili	(Subproyecto a Ser Identificado)	180,000 *	3,436,970
--	--	Imprevistos	183,030	3,620,000
<b>TOTAL</b>				<b>\$ 3,620,000</b>

\*Costo indicativo a ser revisado en el campo

Fuentes:

1. Proyectos prioritarios: sumisiones de los gobiernos locales a AMUNIC.
2. Costos: (a) sumisiones de los gobiernos locales a AMUNIC; (b) perfiles de proyecto preparados por PADCO.

### **2.1.3 Field Selection of Sub-projects**

The list of municipalities and tentative sub-projects was revised in the field. PADCO and FISE staff paid visits to the selected municipalities to review every specific sub-project in the field and to assess the pre investment status. At the end of this selection process a new and final list of sub-projects was produced by PADCO and approved by USAID. Chart No.2 presents the list of sub-projects and estimated costs.

Subsequently, two changes were recommended and approved by USAID. The first change was the replacement of the Totogalpa sub-project by the Ocotal sub-project. The second change, in Pueblo Nuevo, involved the substitution of urban street paving sub-project for a rural road repair sub-project. Minor changes were produced in sub-project cost estimates based on real costs on April 26, 2000. See Attachment No.2

### **2.1.4 FISE Assistance**

Once the list of projects was approved by USAID, PADCO and FISE agreed on institutional participation and responsibilities. These responsibilities are those contained in the FISE PIL and the PADCO Contract amendment (Attachment No.3 ).

**Chart No. 2**  
**Municipal Infrastructure Damaged by Hurricane Mitch**  
**Revised List of Sub-Projects**

#	Project Description	Municipality	Estimated Costs in US\$	Comments
1	Reconstruction of Don Leon Bridge	Chinandega	135,246.00	Design to be contracted
2	Storm drainage Barrio San Antonio	Ciudad Darío	80,573.00	Design to be contracted
3	Street paving (adoquinado) of Urban Area	El Tuma-La Dalia	187,705.00	Designed by the municipality
4	Storm drainage Urban Area	Estelí	141,804.00	Design to be contracted
5	Storm drainage Northern Section Urban Area	Leon	184,910.00	Designed by the municipality
6	Bridge reconstruction Rural Road	Macuelizo	214,667.00	Design to be contracted
7	Retention wall in Rio Grande of Matagalpa Urban Area	Matagalpa	162,423.00	Designed by the municipality
8	Reconstruction Rural Road Yaragüe-El Zapote	Mozonte	164,180.00	Bidding documents prepared by FISE
9	Reconstruction of two bridges and drainage Rural Road Ocotal-Macuelizo	Ocotal *	142,213.00	Design to be contracted
10	Street paving in Urban Areas	Palacagüina	113,935.00	Design to be contracted
11	Street paving and storm drainage Urban Area	Posoltega	76,312.00	To be better identified and designed
12	River Dike	Posoltega	295,702.00	Designed by MTI/USAID
13	Street paving in Urban Areas	Pueblo Nuevo	139,754.00	Municipality will provide design
14	Storm drainage in the Urban Area	Quezalguaque	74,509.00	Design to be contracted
15	Rural Road Reconstruction	San Francisco Libre	125,000.00	Design to be contracted
16	Storm drainage and River bed cleaning (Quebrada Grande)	San Juan de Limay	160,328.00	Design to be contracted
17	Reconstruction of Rural Road San Lucas-Las Playitas	San Lucas	158,771.00	Bidding documents prepared by FISE
18	Bridge Reconstruction Las marías	Santa María	226,311.00	Design to be contracted
19	Reconstruction bridge community Las Marías	Telica	83,279.00	Design to be contracted
20	Rural Road Pinares-El Naranjo (Rehabilitation)	Telpaneca	186,721.00	Bidding documents prepared by FISE
21	Reconstruction street paving of 1265.4 m Urban Areas	Tipitapa	149,754.00	Design provided by the municipality
22	Reconstruction of River deck and platform	Wiwilí	91,394.00	Design to be contracted
23	Rural Road reconstruction sector Yalagüina-El Empalme	Yalagüina	138,197.00	Bidding documents prepared by FISE
24	Rural Road reconstruction	Totogalpa	*	Road was under repair at the time of the visit
Sub total			3,433,688.00	
Management			100,153.00	
Miscellaneous			36,159.00	
<b>TOTAL</b>			<b>3,570,000.00</b>	

\* Ocotal replaced Totogalpa

## **2.2. Design Contracting: Difficulties and Solutions**

The sub-projects were at different stages of design at the beginning of the Component activity. Four of them had designs already completed. Four rural roads rehabilitation sub-projects were to have an evaluation survey by FISE instead of a design. Thirteen designs were to be contracted with local A&E firms.

*The four sub-projects with completed designs and ready for construction contracting were as follow:*

- The Leon and Matagalpa sub-projects had been designed by the municipalities and were to be implemented by them.
- The Tipitapa sub-project was also designed by the municipality and was to be implemented by FISE.
- The Posoltega sub-project was designed by USAID/MTI and was to be implemented by FISE.

*A summary of those already designed sub-projects is provided below:*

- Posoltega River Dike Project (600m), designed by MTI/USAID (not reviewed) with an estimated cost of US\$300,000.
  - León Storm Drainage in the Northern Section of the Urban Area, designed by the municipality and reviewed by PADCO, with an estimated cost of US\$ 177,541. The length of the drainage is 650m.
  - Matagalpa Retention Wall in Rio Grande of Matagalpa Urban Area, designed by the municipality and reviewed by PADCO, with an estimated cost of US\$184,344. The construction of the wall and sidewalks covers an area of 684m<sup>2</sup>.
  - Tipitapa Reconstruction of 1,265.4 m of Street Paving in Urban Areas, designed by the municipality and reviewed by FISE/PADCO, with an estimated cost of US\$149,754.
- This sub-project design was later redesigned using concrete blocks (adoquin) instead of asphalt.

*The four (4) rural roads rehabilitation sub-projects subject to FISE's surveys are as follow:*

- Mozonte Reconstruction of 12km of Rural Road Yaragüe-El Zapote. Bidding documents to be prepared after inspection by FISE.
- San Lucas Reconstruction of Rural Road San Lucas- Las Playitas (11km). Bidding documents to be prepared after inspection by FISE.
- Telpaneca Rehabilitation of Rural Road Pinares- El Naranjo (10 km). Bidding documents to be prepared after inspection by FISE.
- Yalagüina Rural Road Reconstruction in the sector Yalagüina- El Empalme. Bidding documents to be prepared after inspection by FISE.

Based on a later survey, the sub-projects of Mozonte and Telpaneca were cancelled under PADCO recommendation, since another donor was assisting those communities with the rural roads reconstruction.



**Thirteen Sub-projects Identified to be Designed.** Thirteen sub-project designs had to be contracted with local A&E firms and their designs were expected to be completed by June, 2000. These projects were as follow:

- Ciudad Darío. Storm drainage in Barrio San Antonio. The length of the drainage is 444.7 m.
- El Tuma/La Dalia 6,423 m<sup>2</sup> of Street Paving using concrete blocks (adoquín) of Urban Area. The municipal design was not accepted by PADCO.
- Estelí Storm Drainage in the Urban Area. The length of the drainage is 560 m covered and 440 m of open drainage.
- Macuelizo Bridge Reconstruction Rural Road.
- Palacagüina Street Paving in Urban Areas (4,200m<sup>2</sup>).
- Posoltega Street paving and Storm Drainage in Urban Area.
- Quezalguaque Storm Drainage in the Urban Area. The length of the drainage is 615 m.
- San Juan de Limay Storm Drainage and River bed cleaning (Quebrada Grande).
- Santa María Bridge Reconstruction Sector Macuelizo- Santa María.
- Telica Reconstruction Bridge Community Las Marías.
- Wiwilí Reconstruction of River Deck and Platform.
- Chinandega Reconstruction of Don Leon Bridge.

Designs were completed for twelve of these thirteen sub-projects. The Posoltega Street Paving sub-project was cancelled. In addition, a new design was prepared for the Tipitapa street paving project, bringing the total designs to thirteen.

Only five were contracted for construction, the rest were cancelled by USAID in February 2001 (See explanation later on in this report). The remaining seven designs, once approved by PADCO, were delivered to FISE to be implemented using other project funds or other donors

**Sub-projects in Special Situations.** Three of the sub-projects, initially identified, were cancelled on February 2001 because they were constructed by other institutions.

- The sub-project identified for San Francisco Libre Rural Road to join San Francisco Libre with the Carretera Panamericana (11 kms.) was being implemented by MTI.
- Pueblo Nuevo 5,000 m<sup>2</sup> of Street Paving in Urban Areas. The municipality was to deliver the design, but it never materialized.
- Totogalpa Rural Road Reconstruction. The sub-project was being reconstructed by MTI. USAID approved the replacement of this sub-project with the Ocotal Reconstruction of Two Bridges and Drainage in the Rural Road Ocotal-Macuelizo.

### **2.3 The Design Process: Difficulties and Solutions**

As previously stated, municipal sub-projects were at different stages of design. Of the four (4) sub-projects whose designs were complete, three (3) were executed without difficulties (Posoltega, León and Matagalpa) and one (Tipitapa) was redesigned. Four rural road survey evaluations and thirteen designs (including the Tipitapa redesign) were successfully completed during the Project. A total of 20 sub-project designs out of 23 were completed.

The original design of the Tipitapa paving sub-project was using asphalt, on approximately 1,200 linear meters. As the design was complete and the reconstruction project was beginning, it was considered a good candidate in order to demonstrate speedy implementation.

Construction of the Tipitapa Municipal Street Paving Project, was contracted out by FISE in December 1999. After an impromptu site visit in late April, representatives of the US Corps of Engineers advised USAID that the paving standards used in the sub-project were inadequate. The reduction in the thickness of paving material agreed upon by the contractor and FISE engineers and the local PADCO engineer in order to reduce costs and bring the sub-project in within the budget established by USAID was an issue. Subsequent discussions among the parties revealed a substantial disparity in national and international approaches to technical norms and standards for the rehabilitation of damaged infrastructure. Potential remedies were under discussion by the involved parties for several weeks when, at USAID's request, FISE suspended the contract's work on 23 March 2000. See Attachment No. 4

In order to avoid similar problems and to ensure the quality of other FISE reconstruction projects, PADCO proposed that an expatriate engineer be put on the job for quality control purposes. The Mission authorized PADCO to do so and approved a no cost budgetary modification for this purpose. By all accounts, the expatriate engineer hired by PADCO played a key role in ensuring that reconstruction project design and construction meet internationally accepted norms and standards and that the work was being completed on time and on budget.

The Nicaraguan A&E consulting companies are not accustomed to designing construction projects using international standards for drawings, plans and construction specifications. This situation put an extraordinary burden on PADCO's schedule of activities and increased the time required to complete designs, revisions, comments and corrections. Designs originally contracted for three (3) months, were delivered after twelve months incomplete.

Experience varied from company to company in the evaluation of project designs and construction documents, as evidenced by the prepared documents submitted. In some cases, the lack of acceptable work may have been due to lack of experience. However, in other cases the lack of a positive attitude and intention to produce an acceptable product caused problems, even as the A&E contractor was technically qualified.

The lack of a positive professional attitude to produce acceptable sub-project documents was evidenced by the resistance of A&Es to make corrections as the documents were returned for review, in some cases several times, with same erroneous data. Part of the problem could also be that work was being done by sub-professionals, without a review by competent engineers. It also is possible that the A&E consultant had too many projects and is overloaded with work.

The problems presented by the A&Es could be summarized as follow:

- Some documents presented had poorly conceived designs with no alternative solutions suggested and a lack of clear ideas on the identification and solution to problems.

- Design concepts were usually more an opinion or conjecture than an idea based on applicable norms, design criteria, adequate and proper data.
- There was generally a lack of important details on the plans, the absence of topographic reference drawings, soil borings, location of possible material sources and laboratory test data, etc.
- Mistakes in calculations, dimensions on plans, quantity calculations, field topographic books, references in specifications and general notes.
- Conflicting statements in the same design report, plans and specifications.
- Technical specifications were normally not written for the specific project but, rather, are a volume of writing about activities not pertaining to the project and in many cases a copy of general specifications.

A more demanding design, more accurate lab tests, US or International standards, clear and precise specifications for constructions has not been the norm in Nicaragua. PADCO together with US Corps of Engineers and others held orientation meeting on May 3, 2000 where all consultants and interested parties were invited to participate for the establishment of professional work quality, criteria to be followed and check list of specific elements to analyze when receiving project documents.

With the acceptance of more strict design criteria, the A&Es requested additional time to deliver the contracted studies. PADCO/FISE expected that a more accurate design and enough revision time would reduce extra construction costs and delays. Considering that PADCO/FISE had the rainy season to complete the design review and contracting, it was agreed to extend the delivery date in response to the request of A&E consultants.

FISE's contribution to solve the problem was extremely limited and PADCO did not have sufficient leverage to force the resolution of this situation. In fact, PADCO preferred to accept unfinished designs to be completed at PADCO offices in order to expedite the project implementation. Of the thirteen sub-projects designs originally contracted, PADCO had to complete or redo nine of them. However, it is important to mention that all sub-projects designs were approved by PADCO and delivered to FISE for bidding. The subsequent USAID decision to cancel implementation of several sub-projects did still leave FISE with the possibility of implementing them with other donor resources.

The Attachment No.5 contains the PADCO comments to all sub-project designs, except for the El Tuma/La Dalia sub-project that was designed by municipal engineers with the direct advisory assistance of PADCO.

## **2.4 Reduction of the Initial Program: Reasons for Canceling Sub-projects**

Between January 15 and February 15, and after finishing the sub-project designs, review and approval by PADCO and FISE, PADCO sent all thirteen sub-projects with completed designs to FISE for contracting.

On January 19, 2001 PADCO had sent a letter to USAID containing several recommendations to expedite the implementation of the project, one of which was the request to cancel 5 sub-projects whose designs, for a variety of different reasons, were never contracted by the beneficiaries (See Attachment 6). Sub-project cancellations proposed by PADCO were as follow:

- San Francisco Libre, road repair.
- Mozonte, rural road reconstruction.

- Telpaneca, rural road reconstruction.
- Pueblo Nuevo, urban street paving (referred to in the letter as San Lucas by mistake)
- Additional Posoltega urban storm drainage.

In the letter mentioned above, PADCO requested authorization from USAID to finalize ten (10) sub-projects that were pending minor design details that the FISE consultants refused to complete. These 10 sub-projects designs were finalized by 2/15/2001 by PADCO and sent to FISE for contracting. In the mean time, USAID requested PADCO to send the completed designs to USACE for further review and for its evaluation of the feasibility of completing the construction of the sub-projects during the remainder of the year. As a result of the USACE analysis and under its advice, USAID decided to cancel seven (7) additional sub-projects as follows:

- The Telica Bridge community Las Marias.
- The Chinandega access to Don Leon Bridge road repair.
- The Ciudad Dario storm drainage.
- The San Juan de Limay storm drainage.
- The Macuelizo rural road repair.
- The Santa Maria rural road repair.
- The Ocotal rural road repair.

The failure of the Tipitapa sub-project design and the increase in design requirements to comply with international standards, combined with the inability of local A&Es to produce sound and quality designs caused substantial delays in sub-project contracting by FISE and required PADCO to contract out additional help to finalize the documentation. These delays has had a direct impact on the USAID decision s to cancel the sub-projects, since it was believed that there was a distinct possibility that construction could not be completed on time (before 12/31/01).

As a result of the situation mentioned above, in late February 2001, USAID officially informed PADCO and FISE of the cancellation of 12 infrastructure sub-projects and of the corresponding reduction in project resources from US\$3,570,000 to US\$2,070,000. See Attachment No. 7.

## **2.5 Construction Contracting: Implementation Difficulties**

Eleven construction projects were contracted and ten were satisfactory concluded.

### **2.5.1 Posoltega River Dike Project (600m): Total Cost C\$3,608,928.72**

Posoltega was badly flooded by the Posoltega River as a result of Hurricane Mitch. Without protection, Posoltega would be a candidate for flooding every time that the rains raise the Posoltega river level. After the Hurricane, members of the USAID (USDA) met with MTI engineers to design some kind of protection to the city, a preliminary solution of the construction of a protective dike, originating this reconstruction sub-project

The sub-project design was completed by USAID/MTI. The construction was contracted with IAGSA with a final cost of C\$3,483,428.72. The supervision cost was C\$125,500. There were some mistakes in the calculation of the amount of work that increased the original construction cost. The sub-project was constructed in 28 days and was inaugurated on December 12, 1999.

### **2.5.2 León Storm Drainage in the Northern Section of the Urban Area (650m): Final Cost C\$2,290,072.38**

The north section of the city of Leon was frequently flooded by normal rains due the lack of channels of storm drainage systems of any kind. The sector with approximately 1000 beneficiary families had requested solution of the problems to the municipality, but it could not respond because of the lack of financial resources when Mitch hit. The area was completely flooded. The mayor asked USAID to include this sub-project in the reconstruction program.

The design was completed by the Municipality of Leon and revised by PADCO. The construction was contracted with Solórzano Ings. and M.C. Constructors. The construction was initiated working in two fronts and progressed normally. The cost of construction and supervision was C\$2,290,072.38. It was completed on July 11th, 2000 and inaugurated.

### **2.5.3 Matagalpa Retention Wall in Rio Grande of Matagalpa Urban Area: Total Cost C\$2,012,501.73**

Matagalpa's first avenue was severely damaged by the Matagalpa River (Rio Grande), due to large amount of water generated by Hurricane Mitch. In order to protect the city, the first avenue and the surrounding housing, the municipality had identified the need for a protection wall to prevent future damages. PADCO reviewed the municipal designs and recommended construction.

The design was completed by the Municipality of Matagalpa. The construction of the wall and sidewalks cover an area of 684m., and was contracted with PALSA, with a total cost of C\$1,975,751.73. The supervision cost was C\$36,750. The construction advanced with no difficulties and it was finished on May/00. The project was inaugurated on July 12/00

### **2.5.4 Estelí Storm Drainage in the Urban Area: Final Cost C\$1,439,079.44. (The length of the drainage pipe is 442.52 m in an excavated and backfield trench.)**

The design was contracted by FISE with PROISA with a cost of C\$ 102,863.04. PADCO comments/corrections were delivered to the consultant through FISE in November, requesting corrections to specifications and plans as well as completion of topography and geophysical exploration. Due to lack of consultant response, PADCO completed the design for this project.

The construction was contracted in late March with DIPRECO for a total cost of C\$1,222,797.40. The supervision was contracted with Ing. Gilberto Chavarria, at a cost of C\$113,419.00.

The rains had a damaging effect on this project. The soil type is extremely difficult to work with and had to be removed and exchanged with loaned material. A change order was signed authorizing the contractor to import material from a lending bank.

The project discharge was modified to protect the channel from erosion at the end of it. A change order was processed by FISE to amend the contract.

FISE had to amend the project and extend the time to recognize rains and delays due changes in earthwork and the discharge. After initial difficulties, the sub-project was completed and delivered to the municipality.

**2.5.5 Quezalaguaque Storm Drainage in the Urban Area: Total Cost C\$1,087,547.75 (The length of the covered open channel is approximately 300m and 455.44 m of drainage pipe.)**

The design was contracted by FISE with GPM, with a cost of C\$43,890.83. PADCO made corrections to the first draft of the design and sent them to GPM through FISE on 9/5/00. Corrections received to the basic design concepts of GPM resulted in extremely high costs and did not comply with basic concept of relieving storm drainage in the area. PADCO gave instructions for reformulating the project and had to contract a different consultant who completed it in early February.

The construction was contracted with COIAGSA in late March/01 for a 90 days duration period with a final cost of C\$948,656.92. The supervision was contracted with Ing. Ignacio Zamora for C\$95,000.00.

COIAGSA was impacted by the FISE's change of pay schedule, creating difficult financial conditions to the project. However, the contractor could complete the project on time, recognizing a 10 days extension due to rains reported earlier.

It was required to modify the drainage discharge of the channel in order to prevent future erosion. An amendment was issued by FISE asking the contractor to build the additional work. This additional work delayed the completion of the project a couple of weeks. However, the sub-project was successfully completed and delivered by FISE to the municipality.

**2.5.6 Wiwilí Reconstruction of River Dock and connecting streets: Final Cost C\$3,365,135.49**

The design was contracted by FISE with PROISA at a cost of C\$135,782.08. PADCO's comments/corrections were delivered to the consultant through FISE in November. The design concept was extremely poor and the specifications unacceptable. PADCO completed the design of the sub-project using a different consultant. As of 03/31/01 the construction was awarded to CONAMERICA at a final cost of C\$2,930,985.91 and the supervision to Ing Henry Darce at a cost of C\$298,367.50. The construction of the sub-project was initiated in early April/01.

On the beginning this project was affected by the contractor's slow pace of implementation. PADCO's estimated that at the implementation pace, the contractor would take more time to complete the work. This was not acceptable and in those terms it was communicated to FISE. The change order to improve the quality of the streets required some time extension too.

The main problem was the lack of adequate equipment, which PADCO and the FISE supervisor called the contractor's attention,- without positive response.

Fortunately the rains had very little impact on the project's infrastructure and the work inside the river was completed eliminating the possibility of rain damages. Despite initial difficulties, the sub-project was completed satisfactorily by the contractor.

**2.5.7 Palacagüina Street Paving in Urban Areas (5,091.56m<sup>3</sup>): Total Cost C\$2,027,186.93**

The design was contracted by FISE with CORASCO at a cost of C\$89,294.02, and as of early December/00 this sample project was sent to the USACE for their comments. Once approved by PADCO, it was sent to FISE for contracting on 12/06/00. The project construction was

contracted with CODESA at a cost of C\$1,773,441.91, with a 90-day duration in mid March and was expected to be completed by mid June. The supervision was awarded to Ing. Denis Largaespada at a cost of C\$164,451.00.

The Contractor's financial situation affected the completion of it. FISE extended the time, recognizing some impacts from the rains but not more than 20 days. The sub-project was completed satisfactorily by CODESA.

#### **2.5.8 El Tuma/La Dalia Street Paving (adoquinado) of 6,423 m2 in the Urban Area: Total Cost C\$1,779,291.81**

For this project, the municipality was responsible for the design. PADCO delivered a third round of modifications to the municipality. Final corrections were incorporated in the documents, and specifications approved by PADCO and sent to FISE on 11/14/00 for construction contracting. The construction was contracted with EMCONORSA at a final cost of C\$1,582,690.26 and started in late March/01. Completion was expected by late June. The supervision was awarded to Ing. Mariano Martínez at a cost of C\$196,601.55.

The construction progress was slow for the following reasons: 1) the rains affected the implementation pace, impeding the earth works and damaging previous work; 2) the Contractor's financial situation was affected by the FISE's change in pay schedule. The contractor lacked the financial resources to buy concrete blocks and other supplies.

To help the Contractor, in late June FISE guaranteed the contractor's purchases of concrete blocks with the provider. However, this change did not produce the expected results. The sub-project was finally completed satisfactorily.

#### **2.5.9 San Lucas Reconstruction of Rural Road San Lucas- Las Playitas (11km): Total Cost C\$2,374,519.80**

Contracting documentation was prepared by FISE. Road construction was contracted with CAFESA at a total cost of C\$2,194,653.14 and the supervision with Ing. Carlos Fonseca at a cost of C\$179,866.66. The construction was initiated in late March/01 for a 90 day period.

This project was completed as of June 30<sup>th</sup>. However, the rains produced additional damages to the project and an additional change order was negotiated with the contractor to improve some sections of the road in order to guarantee a durable work. The soil in that part of the country is extremely difficult to work with because of its high plasticity. Additional material had to be imported from outside banks, as a means to protect the investment.

After sub-project was completed and delivered to the municipality, PADCO prepared maintenance manuals and training materials and met with the Mayor to start meetings with the community.

#### **2.5.10 Yalagüina Rural Road Reconstruction in the Sector Yalagüina-El Empalme: Final Cost C\$1,171,782.87**

This project documentation was prepared by FISE and was contracted in late March/01 with IDEPSA at a final cost of C\$1,007,331.87 for a 90-day implementation period. The supervision was contracted with Ing. Carlos Fonseca at a cost of C\$164,451.00.

This project was completed on June 15<sup>th</sup> and satisfactorily received by FISE.

PADCO and the Municipality conducted a maintenance workshop with the community. A preliminary meeting with the Community took place on June 17<sup>th</sup> to discuss the participation of the community and its contribution. A second meeting was pending to assign maintenance sections. PADCO worked on the maintenance manuals to train not only community members but also municipal staff.

#### **2.5.11 Tipitapa Reconstruction of 10,470.30 m<sup>2</sup> of Street Paving in Urban Areas: Final Cost C\$2,751,505.75**

The Hurricane Mitch destruction of bridges in the Panamericana highway, turned Tipitapa's streets in the normal detour while the passage was restored. The city streets were not design for a heavy traffic and were partially destroyed. The city mayor asked for the reconstruction and the pavement of some streets, using a design prepared by the municipality.

This project was the subject of a serious discussion on local vs international construction standards and its initial contract was cancelled until the project was redesigned and re contracted.

Redesign was contracted with CORASCO by FISE at a cost of C\$207,500.60. With a heavy involvement of PADCO staff, final design was approved for cement block (adoquin) pavement according to a cost analysis of three pavement types having the same structural values. The final cost of C\$2,365,074.56 was contracted with IAGSA for construction and was signed on 12/26/2000. The supervision was contracted with Ing. Mariano Martínez at a cost of C\$178,930.39.

The new contractor implementation program was very closely monitored. Even though the quality of construction was acceptable, the materials (adoquines) did not meet quality specifications. PADCO and FISE complained to the contractor on several occasions, but never got a positive reaction.

Subsequently, the project experienced severe difficulties. The Contractor failed to comply with the quality of the materials contracted and used a variety of excuses for not providing the quality concrete blocks, as contained in the project specifications. The month of April was especially complex and FISE, as required by PADCO, had several meetings with IAGSA and the Insurance company (La Metropolitana) but generated very limited results. Finally, on May 21st. FISE decided to cancel the contract with IAGSA and called for proposals from other construction companies in order to finish the work. FISE had a new contractor (SECSA) identified to complete the work when IAGSA sued FISE requesting that new a new contract be prohibited until the legal problem was resolved. This request was granted. This determination stopped all project activities to date. The Project's legal situation was finally resolved and the project completed and inaugurated in December 2001.

#### *Difficulties Presented During Construction Include the Following:*

- Lack of financial capacity of contractors. All contractors have had difficulties due to their financial situation. The change in FISE's work schedule has changed the constructors pay period from one week to two (at least). This situation has had a damaging effect on contractors' performance. A common characteristic observed among contractors in the country was a dependency on client resources to execute the projects.
- Contractors have reluctantly accepted PADCO quality control and close supervision, affecting the implementation of sub-projects due to contractors' claims. Apparently FISE



has never closely supervised and controlled quality, -so contractors resent PADCO intervention.

## **2.6 Project Completion, Transfer, and Sustainability**

Each municipality officially received from FISE the transfer of the project through the completion report prepared by FISE and signed by FISE, PADCO and the municipality in accordance with USAID letter of Feb 2001. Attachment 9.

Also PADCO prepared 5 maintenance manuals: Storm Drainage Maintenance Manual, Contention Wall Maintenance Manual, Street Pavement (adoquinado) Maintenance Manual, River Dock Maintenance Manual, and a Rural Road Maintenance Manual. These were delivered to each municipality according to the project implemented.

Pending activities include training to community members and municipal staff on project maintenance, and agreements with the beneficiaries to arrange maintenance responsibilities

## **2.7 Project Implementation Summary**

Of the twenty-three (23) originally approved sub-projects, sixteen (16) were designed (3 of them by the municipalities), and eleven (11) were implemented. The budget for project implementation was reduced from US\$3,570,000 to US\$2,070,000, to reflect the reduction in project scope.

The cost of the 11 implemented sub-projects and the cost of designs of those 7 sub-projects cancelled for different reasons was C\$25,064,883.36 approximately equivalent to US\$1,928,067.51 (considering an average exchange rate of C\$13.00/1 US\$). The difference to the resources approved (\$2,070,000) is \$141,932. This represents the combination of funds available to complete the Tipitapa sub-project (approx. \$77,000) and the resources originally planned for administrative expenses and miscellaneous (approx \$65,000). These resources were considered as assigned to FISE.

It is important to notice that the project implementation cost increase from the original contracting of sub-projects was only 5.7%, of which 3.7% corresponds to the Posoltega sub-project that was implemented under extreme pressure. See Chart No.3.

**HURRICANE MITCH DAMAGED INFRASTRUCTURE RECONSTRUCTION**  
**FINAL REPORT**  
**AS OF 10/31/01**  
**(using FISE's figures)**

Project Description	Municipality	Design Contractor	Design Cost C\$	Construction Contractor	Construction Cost C\$			Supervision Contractor	Supervision Cost C\$	Total Sub project Cost C\$
					Contracted	Change Order	Final Construction Cost			

**a.- Projects Completed**

River Dike	Posoltega	USAID/MTI		IAGSA	2,549,671.50	933,757.22	3,483,428.72	Henry Darce	125,500.00	3,608,928.72
Retention wall in Rio Grande Urban Area	Matagalpa	Municipality		PALSA	1,975,751.73	-	1,975,751.73		36,750.00	2,012,501.73
Storm drainage Northern Section Urban Area	Leon	Municipality		Solorzano Ings.y M.C. Constructores	2,322,827.00	-21,303.28	2,290,072.38	*	Included in construction cost	2,290,072.38
Storm drainage Urban Area	Estelí	PROISA	102,863.04	DIPRECO	1,148,848.66	73,948.74	1,222,797.40	Gilberto Chavarria	113,419.00	1,439,079.44
Storm drainage in the Urban Area	Quezalguaque	GPM Ing.	43,890.83	COIACSA	989,923.71	41,266.79	948,656.92	Ignacio Zamora	95,000.00	1,087,547.75
Reconstruction of River Dock and platform	Wiwili	PROISA	135,782.08	CONAMERICA	2,622,326.50	308,659.41	2,930,985.91	Henry Darce	298,367.50	3,365,135.49
Street paving in Urban Areas	Palacagüina	CORASCO	89,294.02	CODESA	1,727,466.03	45,975.88	1,773,441.91	Denis Largaespada	164,451.00	2,027,186.93
Street Paving in Urban Area	El Tuma-La Dalia	Municipality		EMCONORSA	1,714,773.65	132,083.39	1,582,690.26	Mariano Martínez	196,601.55	1,779,291.81
Rural Road Reconstruction San Lucas-Las Playitas	San Lucas	FISE J.E Narvaez	17,250.00	Café, S.A.	1,979,895.99	214,757.15	2,194,653.14	Carlos Fonseca	179,866.66	2,391,769.80
Rural Road Reconstruction sector Yalagüina-El Empalme	Yalagüina	FISE		IDEPSA	939,140.91	68,190.96	1,007,331.87	Carlos Fonseca	164,451.00	1,171,782.87

**b.- Projects not concluded**

Reconstruction Street Paving Urban Areas	Tipitapa	CORASCO	238,865.10	IAGSA	2,365,074.56	956,054.32 **	1,409,020.24	Mariano Martínez	178,930.39	1,826,815.73
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Project Description	Municipality	Design Contractor	Design Cost C\$	Cosntruction Contractor	Construction Cost C\$			Supervision Contractor	Supervision Cost C\$	Total Sub project Cost C\$
					Contracted	Change Order	Final Construction Cost			

**c.- Projects cancelled**

Reconstruction Street Paving Urban Areas	Tipitapa	Municipality		METALCON	1,374,825.00		1,374,825.00	Jaime Icabalceta	78,312.00	1,453,137.00
Storm drainage and River bed cleaning (Quebrada Grande)	San Juan de Limay	INCICO	36,165.73							36,165.73
Reconstruction Street Paving Urban Areas	Chinandega	GPM Ing.	31,867.00							31,867.00
Bridge Reconstruction Macuelizo-Santa María	Santa María	CORASCO	139,276.00							139,276.00
Bridge Reconstruction Community Las Marias	Telica	GPM Ing.	100,993.42							100,993.42
Bridge Reconstruction Rural Road	Macuelizo	CORASCO	91,224.00							91,224.00
Reconstruction of two Bridges and Drainage Rural Road Ocotál-Macuelizo	Ocotál	CORASCO	168,370.00							168,370.00
Storm Drainage Barrio San Antonio	Ciudad Darío	INCICO	43,737.56							43,737.56
Street Paving and Storm Drainage Urban Area	Posoltega									-
Street paving in Urban Areas	Pueblo Nuevo									-
Reconstruction Rural Road Yaragüe-El Zapote	Mozonte	FISE								-
Rural Road	San Francisco Libre									-
Rural Road Pinares-El Naranjo (Rehabilitation)	Telpaneca	FISE								-
<b>TOTAL</b>			<b>1,239,578.78</b>		<b>21,710,525.24</b>	<b>1,450,635.90</b>	<b>22,193,655.48</b>		<b>1,631,649.10</b>	<b>C\$ 25,064,883.36</b>

\* The municipality of Leon returned C\$11,451.34 to FISE

\*\* Amount available for contracting sub project completion

### **3. LESSONS LEARNED**

1. It is necessary to make a clear definition of the meaning of reconstruction, urgent restoration of damage infrastructure and full reconstruction under international norms and standards of rebuilt infrastructure.
2. This difference is especially important when the reconstruction activities have a limited and tight implementation period.
3. It is important to analyze the environmental customs and traditions of the country where one is trying to implement reconstruction activities.
4. It is also important to do an analysis of the private construction sector to get an adequate classification of implementation capacity of local firms. In our project, FISE contracted implementation with very small companies whose financial resources were heavily dependent on the owner's funds. Most of the project delays were due to the lack of financial capacity and not on technical implementation problems.
5. Before initiating implementation project, a clear definition of what it is expected should be made and workshops with all the participants should be conducted in order to guarantee that everybody understand what is expected from them.
6. When implementing an emergency program expeditious contracting, supervising and paper work handling is a must. In this type of project you cannot depend on traditional central governmental institutions that are of a bureaucratic nature, especially their systems and procedures.
7. It would be worthwhile to analyze the possibility of delegating implementation responsibilities to local governments. At least in this project sub-projects implemented by municipalities were much more successfully and timely completed than the ones implemented by the national institution.
8. The success of implementation of any kind of infrastructure project is directly dependent on the quality of the designs prepared. In some countries (as is the case of Nicaragua), very little attention is paid to sound designs, which frequently is a major cause of cost overruns and delays.

## B. ADMINISTRATIVE & FINANCIAL INFORMATION

## 1. GRANT INFORMATION

a- Total Grant	US\$ 2,070,000 *
Expenditures last quarter	413,688
Cumulative expenditures	1,928,068 **
Remaining balance for Tipitapa, Admin. and Misc.	141,932
b- Implementation rate	73.1%

## 2. MANAGEMENT CONTRACT INFORMATION – CLIN. 6

a- Total estimated cost	US\$ 640,453
Cumulative expenditures	618,914
Remaining balance	126,296

\* *USAID reduced the project funding by \$1.5 million*

\*\* *Estimated cumulative amount at end of PADCO field work.*

## **ANNEXES**

## PROJECT INFORMATION

- *Municipality:* Posoltega
- *Project Description:* River Dike
- *Cost:*

Design	
Supervision	C\$ 125,500.00
Construction	C\$2,549,671.50
<b>Sub Total</b>	<b>C\$2,675,171.50</b>
Change orders	C\$ 933,757.22
<b>Total</b>	<b>C\$3,608,928.72</b>
- *Contractor:*

Design	USAID/MTI
Construction	IAGSA
- *Supervisor* Ing. Henry Darce
- *Date started* November, 14,99
- *Completion date:* December 12, 1999

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### *Sub-project implementation summary:*

Posoltega was badly flooded, by the Posoltega River due to Hurricane Mitch. Without protection, Posoltega would be a candidate to be flooded every time that the rains raise the Posoltega River level. After the hurricane, members of the USAID (USDA) met with MIT engineers to design some kind of protection to the city, a preliminary solution of the construction of a protective dike, originating this reconstruction sub-project

The sub-project design was completed by USAID/MTI. The construction was contracted with IAGSA with a final cost of C\$3,483,428.72. The supervision cost was C\$125,500. There were some mistakes in the calculation of the amount of work, which increased the original construction cost. The sub-project was constructed in 28 days and was inaugurated on December 12, 1999.



## PROJECT INFORMATION

- *Municipality:* *Matagalpa*
- *Project Description:* *Retention Wall in Rio Grande of Matagalpa.*
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- *Urban Area Cost:*

Design	
Supervision	C\$ 36,750.00
Construction	C\$1,975,751.73
<b>Sub Total</b>	<b>C\$2,012,501.73</b>
Change orders	C\$
<b>Total</b>	<b>C\$2,012,501.73</b>
- *Contractor:*

Design	Municipality
Construction	PALSA
- *Supervisor*
- *Date started*
- *Completion date:*

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### *Sub-project implementation summary:*

Matagalpa's first avenue was severely damaged by the Matagalpa River (Rio Grande) due to big amount of water poured by Hurricane Mitch. In order to protect the city, the first avenue and the surrounding housing, the municipality had identified the protection wall to prevent future damages. PADCO reviewed the municipal designs and recommended construction.

The design was completed by the municipality of Matagalpa. The construction of the wall and sidewalks cover an area of 684m and was contracted with PALSA, with a total cost of C\$1,975,751.73. The supervision cost was C\$36,750. The construction advanced with no difficulties and it was finished on May/00. The project was inaugurated on July 12/00

## PROJECT INFORMATION

- *Municipality:* León
  - *Project Description:* Storm Drainage Northern Section Urban Area.
  - *Cost:*

Design	C\$
Supervision	C\$
Construction	C\$2,322,827.00
<b>Sub Total</b>	<b>C\$2,322,827.00</b>
Change orders	(C\$ 21,303.28)
<b>Total</b>	<b>C\$2,290,072.38</b>
  - *Contractor:*

Design	Municipality
Construction	Solórzano Ingenieros y M.C.Constructores
  - *Supervisor*
  - *Date started*
  - *Completion date:*
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### *Sub-project implementation summary:*

The north section of the city of Leon was frequently flooded by normal rains due the lack of channels of storm drainage systems of any kind. The sector with approximately 1000 beneficiary families had requested solution of the problems to the municipality, but it could not respond because of the lack of financial resources when Mitch hit. The area was completely flooded. The mayor asked USAID to include this sub-project in the reconstruction program.

The design was completed by the municipality of Leon and revised by PADCO. The construction was contracted with Solórzano Ings. and M.C. Constructores. The construction was initiated working in two fronts and progressed normally. The cost of construction and supervision was C\$2,290,072.38. It was completed on July 11th, 2000 and inaugurated.

## PROJECT INFORMATION

- *Municipality:* *Tipitapa*
- *Project Description:* *Reconstruction of 1,265.4 m of Street Paving (“adoquin”) in Urban Areas.*
- *Cost:*

Design	C\$ 238,865.10
Supervision	C\$ 178,930.39
Construction	C\$2,365,074.00
<b>Sub Total</b>	<b>C\$2,782,870.05</b>
Amount available for construction (C\$ 956,054.32) completion	
<b>Total</b>	<b>C\$1,826,815.73</b>
- *Contractor:*

Design	CORASCO
Construction	IAGSA
- *Supervisor* *Ing. Mariano Martínez*
- *Date started* *1/8/01*
- *Completion date:* *4/21/01 - terminated by FISE*

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### *Sub-project implementation summary:*

The Hurricane Mitch destruction of bridges in the Panamericana Highway turned Tipitapa's streets in the normal detour while the passage was restored. The city streets were not design for a heavy traffic and were partially destroyed. The city mayor asked for the reconstruction and paving of some streets, whose design was prepared by the municipality.

This project was the subject of a serious discussion on local versus international construction standards and its initial contract was cancelled until the project was redesigned and re contracted. The new contractor implementation program was very closely monitored. Even though the quality of construction was acceptable, the materials (adoquines) had not the specified quality. PADCO and FISE complains in several occasions with the contractor, but never got a positive reaction.

After the report (January- March, 2001), the project experienced severe difficulties. The Contractor failed to comply with the quality of the materials contracted and recurred to different excuses for not providing the quality concrete blocks as contained in the project specifications. The month of April was especially complex and FISE, as required by PADCO, had several meetings with IAGSA and La Metropolitana, the insurance company, with very limited results. Finally on May 21<sup>st</sup>. FISE decided to cancel the contract with IAGSA and called for proposals to other construction companies to finish the work. FISE had a new contractor (SECSA) identified to complete the work when IAGSA sued FISE requesting to the Judge that no other company but

IAGSA could be contracted until the legal problem was resolved, which was granted. This determination stopped all project activities to date. The Project's legal situation has not yet changed.

Even though the project was stopped for more than one month now, the infrastructure built has not deteriorated. Finally USAID withdrew the sub-project resources until the legal problems were resolved.

## PROJECT INFORMATION

- *Municipality:* *Estelí*
- *Project Description:* *Storm Drainage in the Urban Area.* The length of the drainage pipe is 1,300 m in an excavated and backfield trench.
- *Cost:*

Design	C\$ 102,863.04
Supervision	C\$ 113,419.00
Construction	C\$1,148,848.66
<b>Sub Total</b>	<b>C\$1,365,130.70</b>
Change orders	C\$ 73,948.74
<b>Total</b>	<b>C\$1,439,079.44</b>
- *Contractor:*

Design	PROISA
Construction	DIPRECO
- *Supervisor*            Ing. Gilberto Chavarria
- *Date started*            4/2/01
- *Completion date:*    7/1/01
- *Extended to:*            7/31/01

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### *Sub-project implementation summary:*

The design was contracted by FISE with PROISA with a cost of C\$ 102,863.04. PADCO's comments/corrections were delivered to the consultant through FISE in November requesting corrections to specifications and plans as well as to complete topography and geophysical exploration. Due to lack of consultant response, PADCO completed the design for this project. The construction was contracted in late March with DIPRECO for a total cost of C\$1,222,797.40. The supervision was contracted with Ing. Gilberto Chavarria at a cost of C\$113,419.00.

The rains had a damaging effect on this project. The soil type is extremely difficult to work with and had to be removed and exchanged with loaned material. A change order was signed authorizing the contractor to import material from a lending bank.

The project discharge was modified to protect the channel from erosion at the end of it. A change order was processed by FISE to amend the contract.

FISE had to amend the project and extend the time to recognize rains and delays due changes in earthwork and the discharge. After initial difficulties, the sub-project was completed and delivered to the municipality.

## PROJECT INFORMATION

- *Municipality:* Quezalguaque
- *Project Description:* *Storm Drainage in the Urban Area.* The length of the paved open channel is approximately 300m and 1,250m of ditch to be deepened.
- *Cost:*

Design	C\$ 43,890.83
Supervision	C\$ 95,000.00
Construction	C\$ 989,923.71
<b>Sub Total</b>	<b>C\$1,128,814.54</b>
Change orders	(C\$ 41,266.79)
<b>Total</b>	<b>C\$1,087,547.75</b>
- *Contractor:*

Design	GPM
Construction	COIACSA
- *Supervisor* Ing. Ignacio Zamora
- *Date started* 3/30/01
- *Completion date:* 6/30/01
- *Extended to:* 7/15/01

### *Sub-project implementation summary:*

The design was contracted by FISE with GPM. With a cost of C\$43,890.83, PADCO made corrections to the first draft and sent them to GPM through FISE on 9/5/00. Corrections received to the basic design concepts of GPM resulted in extremely high costs and did not comply with basic concept of relieving storm drainage in the area. PADCO gave instructions for reformulating the project and had to contract a different consultant who completed it in early February.

The construction was contracted with COIAGSA in late March/01 for a 90 days duration period with a final cost of C\$948,656.92. The supervision was contracted with Ing. Ignacio Zamora for C\$95,000.00.

COIAGSA was impacted by the FISE's change of pay schedule, creating difficult financial conditions to the project. However, the contractor could complete the project on time, recognizing a 10 days extension due to rains reported earlier.

It was required to modify the drainage discharge of the channel in order to prevent future erosion. An amendment was issued by FISE asking the contractor to build the additional work. This additional work delayed the completion of the project a couple of weeks. However, the sub-project was successfully completed and delivered by FISE to the municipality.

## PROJECT INFORMATION

- *Municipality:* Wiwili
- *Project Description:* Reconstruction of River Dock and Connecting Streets.
- *Cost:*

Design	C\$ 135,782.08
Supervision	C\$ 298,367.50
Construction	C\$2,622,320.84
<b>Sub Total</b>	<b>C\$3,056,476.08</b>
Change orders	C\$ 308,659.41
<b>Total</b>	<b>C\$3,365,135.49</b>
- *Contractor:*

Design	PROISA
Construction	CONAMERICA
- *Supervisor* Ing. Henry Darce
- *Date started* 4/24/01
- *Completion date:* 7/22/01

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### *Sub-project implementation summary:*

The design was contracted by FISE with PROISA at a cost of C\$135,782.08. PADCO's comments/corrections were delivered to the consultant through FISE in November. The design concept was extremely poor and the specifications unacceptable. PADCO completed the design of the sub-project using a different consultant. As of 03/31/01 the construction was awarded to CONAMERICA at a final cost of C\$2,930,985.91 and the supervision to Ing Henry Darce at a cost of C\$298,367.50. The construction of the sub-project was initiated in early April/01.

On the beginning this project was affected by the contractor's slow pace of implementation. PADCO's estimated that at the implementation pace, the contractor would take more time to complete the work. This was not acceptable and in those terms it was communicated to FISE. The change order to improve the quality of the streets required some time extension too.

The main problem was the lack of adequate equipment on which PADCO and the FISE supervisor have called the contractor's attention without positive response.

Fortunately the rains had very little impact on the project's infrastructure and the work inside the river was completed eliminating the possibility of rain damages. The contractor satisfactorily completed the sub-project despite initial difficulties.

## PROJECT INFORMATION

- *Municipality:* Palacagüina
- *Project Description:* Street Paving in Urban Areas (4,200m<sup>2</sup>).
- *Cost:*

Design	C\$ 89,294.02
Supervision	C\$ 164,451.00
Construction	C\$1,727,466.03
<b>Sub Total</b>	<b>C\$1,981,211.05</b>
Change orders	C\$ 45,975.88
<b>Total</b>	<b>C\$2,027,186.93</b>
- *Contractor:*

Design	CORASCO
Construction	CODESA
- *Supervisor* Ing. Denis Largaespada
- *Date started* 3/7/01
- *Completion date:* 6/7/01
- *Extended to:* 7/15/01

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### *Sub-project implementation summary:*

The design was contracted by FISE with CORASCO at a cost of C\$89,294.02, and as of early December/00 this sample project was sent to the USACE for their comments. Once approved by PADCO it was sent to FISE for contracting on 12/06/00. The project construction was contracted with CODESA at a cost of C\$1,773,441.91, with a 90-day duration in mid March and completion was expected by mid-June. The supervision was awarded to Ing. Denis Largaespada at a cost of C\$164,451.00.

The Contractor's financial situation affected the completion of it. FISE extended the time, recognizing some impacts from the rains but not more than 20 days. The sub-project was completed satisfactorily by CODESA.



## PROJECT INFORMATION

- *Municipality:* *El Tuma/La Dalia*
  - *Project Description:* *Street Paving (adoquinado) of 6,423 m2 in the Urban Area.*
  - *Cost:*

Design	C\$
Supervision	C\$ 196,601.55
Construction	C\$1,714,773.65
<b>Sub Total</b>	<b>C\$1,911,375.20</b>
Change orders	(C\$ 132,083.39)
<b>Total</b>	<b>C\$1,779,291.81</b>
  - *Contractor:*

Design	Municipality
Construction	EMCONORSA
  - *Supervisor* Ing. Mariano Martínez
  - *Date started* 3/8/01
  - *Completion date:* 6/5/01
  - *Extended to:* 7/30/01
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### *Sub-project implementation summary:*

For this project the municipality was responsible for the design. PADCO delivered a third round of modifications to the municipality. Final corrections were incorporated in the documents, and specifications approved by PADCO and sent to FISE on 11/14/00 for construction contracting. The construction was contracted with EMCONORSA at a final cost of C\$1,582,690.26 and started in late March/01 and was expected to be completed by late June. The supervision was awarded to Ing. Mariano Martínez at a cost of C\$196,601.55.

The construction progress was slow for the following reasons: 1) the rains affected the implementation pace, created difficulty with the earth work and damaged previous work; 2) Contractor's financial situation was affected by the FISE's change in pay schedule. The contractor lacked the financial resources to buy concrete blocks and other supplies.

To help the Contractor in late June FISE guaranteed the contractor's purchases of concrete blocks with the provider. However, this change did not produce its expected results. The sub-project was finally completed satisfactorily.

## PROJECT INFORMATION

- *Municipality:* *San Lucas*
- *Project Description:* *Reconstruction of Rural Road San Lucas- Las Playitas (11km)*
- *Cost:*

Design	C\$ 17,250.00
Supervision	C\$ 179,866.66
Construction	C\$1,979,895.99
<b>Sub Total</b>	<b>C\$2,177,012.65</b>
Change orders	C\$214,757.15
<b>Total</b>	<b>C\$2,391,769.80</b>
- *Contractor:*

Design	FISE / J.E.Narvaez
Construction	CAFÉ. SA
- *Supervisor* Ing. Carlos Fonseca Gutiérrez
- *Date started* 3/12/01
- *Completion date:* 5/14/01
- *Extended to:* 7/7/01

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### *Sub-project implementation summary:*

Contracting documentation was prepared by FISE. Road construction was contracted with CAFESA at a total cost of C\$2,194,653.14 and the supervision with Ing. Carlos Fonseca at a cost of C\$179,866.66. The construction was initiated in late March/01 for a 90-day period.

This project was completed as of June 30<sup>th</sup>. However, the rains produced additional damages to the project and an additional change order was negotiated with the contractor to improve some sections of the road in order to guarantee a durable work. The soil in that part of the country is extremely difficult to work with because of its high plasticity. Additional material had to be imported from outside banks, as a means to protect the investment.

After sub-project was completed and delivered to the municipality, PADCO prepared maintenance manuals and training materials and met with the Mayor to start meetings with the community.

## PROJECT INFORMATION

- *Municipality:* Yalagüina
- *Project Description:* Rural Road Reconstruction in the sector Yalagüina- El Empalme.
- *Cost:*

Design	C\$
Supervision	C\$ 164,451.00
Construction	C\$ 939,140.91
<b>Sub Total</b>	<b>C\$1,103,591.91</b>
Change orders	C\$ 68,190.96
<b>Total</b>	<b>C\$1,171,782.87</b>
- *Contractor:*

Design	FISE
Construction	IDEPSA
- *Supervisor* Ing. Carlos Fonseca Gutiérrez
- *Date started* 3/8/01
- *Completion date:* 5/14/01
- *Extended to:* 6/14/01

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### *Sub-project implementation summary:*

This project documentation was prepared by FISE and was contracted in late March/01 with IDEPSA at a final cost of C\$1,007,331.87 for a 90-day implementation period. The supervision was contracted with Ing. Carlos Fonseca at a cost of C\$164,451.00.

This project was completed on June 15<sup>th</sup> and satisfactorily received by FISE.

PADCO and the Municipality conducted a maintenance workshop with the community. A preliminary meeting with the Community took place on June 17<sup>th</sup> to discuss the participation of the community and its contribution. A second meeting was pending to assign maintenance sections. PADCO worked on the maintenance manuals to train not only community members but also municipal staff.

## **ATTACHMENTS**